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(54)【発明の名称】　抗菌抗かび剤および抗菌抗かび材料

(57)【要約】
【課題】　従来の抗菌抗かび剤は、素材へ適用した後に必ず十分な抗菌抗かび効果を示すとは限らず、また安全性も、急性経口毒性、皮膚刺激性、粘膜刺激性等を示すものが多いという問題がある。
【解決手段】　アミノ酸と銀イオンとを結合してなる化合物を有効成分とすることを特徴とする。

【特許請求の範囲】
【請求項1】　アミノ酸と銀イオンとを結合してなる化合物を有効成分とすることを特徴とする抗菌抗かび剤。
【請求項2】　アミノ酸と銀イオンとを結合してなる化合物を固体担体に担持させたことを特徴とする抗菌抗かび材料。
【請求項3】　アミノ酸と銀イオンとを結合してなる化合物を液体担体に担持させたことを特徴とする抗菌抗かび材料。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、広範な抗菌抗かび活性を有すると共に皮膚刺激性等の安全性の高い抗菌抗かび剤およびそれを用いた抗菌抗かび材料に関する。
【０００２】
【従来の技術】近年、抗菌抗かび活性を有する薬剤を様々な生活関連素材に適用した新たな機能を付与した機能性素材の開発・利用がさかんに行われている。これらの機能性素材は、抗菌抗かび活性を有する薬剤を当該素材に添加することにより新たな機能を付与したものである。
【０００３】これらの機能性素材分野への抗菌抗かび剤の適用をはかる際、当該薬剤については広範な抗菌スペクトルと安全性を有することが要求されると共に薬剤が素材の品質に悪い影響を及ぼさないこと、耐久性、残効性、経済性にすぐれていることなどが要求される。そこで、これまでの抗菌抗かび剤に使用されている薬剤としては、ベンゾイミダゾール系、ニトリル系、イソチアゾリン系、ハロアリルスルホン系、ヨードプロパルギル系、ベンゾチアゾール系、フェノール系、有機スズ系、ピリジン系、ジフェニルエーテル系、クロルヘキシジン系があげられる。
【０００４】
【発明が解決しようとする課題】このような抗菌抗かび剤は、一種類の薬剤のみでは十分な抗菌抗かび効果を示さないものが多い。また、薬剤自体が示す抗菌抗かび活性がすぐれていても、素材との適合性という点で問題が生じ、素材へ適用した後には、必ず十分な抗菌抗かび効果を示すとは限らない。
【０００５】さらに、これらの抗菌抗かび剤の安全性についてみると、急性経口毒性、皮膚刺激性、粘膜刺激性等を示すものが多く、これらの作用は、概して抗菌抗かび活性の強いものほど強く、このような抗菌抗かび剤を生活環境に適用するには問題があった。
【０００６】
【課題を解決するための手段】本発明は、アミノ酸と銀イオンとを結合した抗菌抗かび剤であり、さらにこの化合物を固体担体や液体担体に担持させた抗菌抗かび材料である。この化合物は、アミノ酸の配位子が銀に配位して錯体を形成しているかまたはアミノ酸と銀とが塩を形成していると考えられる。
【０００７】上記化合物は、アミノ酸と銀イオンとを溶液中で反応させ、生成した溶液をＩＰＡ，アセトン等の有機溶媒にて固体を沈殿させることにより製造される。反応は、例えば銀イオン１モルに対し、アミノ酸を０．５～２モル程度加えて反応させることにより行われる。使用されるアミノ酸は、ヒスチジン、アラニン、グリシン、ロイシン、イソロイシン、フェニルアラニン、バリン、アスパラギン酸、グルタミン酸、セリン、スレオニン、チロシン、アルギニン、アスパラギン、グルタミン、リジン、トリプトファン、プロリン等およびこれらの誘導体等である。
【０００８】使用される銀イオンは、用いるアミノ酸と反応可能な銀化合物を限定なく使用することができる。具体的には、例えば硝酸銀、亜硝酸銀、過塩素酸銀、酢酸銀、ホウふっ化銀等である。さらに、化合物の生成に使用される溶媒としては、上記した銀イオンおよび／もしくはアミノ酸を溶解するものであれば、公知の溶媒を限定なく使用することができる。具体的には、例えば水、水酸化ナトリウム、水酸化リチウム、水酸化カリウムもしくは水酸化セシウム等の水酸化アルカリ金属の水溶液、メタノール、エタノールもしくは、ＩＰＡ等のアルコール類、ベンゼン、トルエン、キシレン、ヘキサンもしくはシクロヘキサン等の炭化水素類、ジエチルエーテル等のエーテル類、アセトン等のケトン類等があり、これを単独または混合している用いることがきる。
【０００９】このようにして得られる化合物は、すぐれた抗菌抗かび作用を有するもので、そのまま抗菌抗かび剤として使用でき、さらに、種々の担体に担持させて抗菌抗かび材料や抗菌抗かび組成物等とすることができる。そこで、このようにして用いる担体としては、固体担体、液体担体およびこれらの混合物のいずれも使用が可能である。
【００１０】固体担体としては、無機固体担体および有機固体担体があげられ、この無機固体担体としてはシリカ、ヒドロキシアパタイト、ゼオライト、酸化チタン等である。これらの無機固体担体と本発明化合物を含有する組成物においては、この固体担体に本発明化合物を固定化されているのが好ましい。このような無機固体担体および本発明化合物を含有する抗菌抗かび材料は、例えばゼオライトー銀に代表される既存の銀含有抗菌剤の欠点である塩の存在下での銀の置換反応による抗菌活性の低下、銀イオンの光による変色等がない。
【００１１】つぎに有機固体担体としては、ろう、ワニス、ラッカー、合成樹脂塗料等の各種ワックス類、ポリエチレン、ポリ塩化ビニル、ポリスチレン、ポリエチレンテレフタラート、アクリル樹脂、エポキシ樹脂、フェノール樹脂、メラミン樹脂、尿素樹脂等の樹脂等があげられる。液体担体としては、水、アルコール類、炭化水素類、エーテル類、ケトン類等の有機溶媒があげられ

る。

【0012】本発明の抗菌抗かび剤または材料における本発明化合物の配合量はとくに限定されないが、0．01～90重量%が好ましい。

【0013】

【発明の実施の形態】以下に本発明の実施の形態を説明する。

第1実施の形態例

硝酸銀3．40g（20mmol）を水50mlに溶解する（溶液A）。L－ヒスチジン3．20g（21mmol）と水酸化ナトリウム0．90g（22mmol）を水20mlに溶解する（溶液B）。

【0014】上記溶液Aを撹拌し、溶液Bを徐々に加える。得られた溶液を撹拌している1000mlのアセトン中に滴下し、5．80gの白色沈殿を得た。この化合物はFT－IR分析よりL－ヒスチジン一銀化合物の生成を確認した。

第2実施の形態例

硝酸銀1．70g（10mmol）を水5mlに溶解する（溶液A）。

【0015】L－アラニン1．78g（20mmol）と水酸化ナトリウム0．80g（20mmol）を水10mlに溶解する（溶液B）。上記溶液Aを撹拌し、溶液Bを徐々に加える。得られた溶液を撹拌している1000mlのアセトン中に滴下し、2．50gの白色沈殿を得た。この化合物はFT－IR分析よりL－アラニン一銀化合物の生成を確認した。

【0016】第3実施の形態例

硝酸銀1．70g（10mmol）を水5mlに溶解する（溶液A）。L－グリシン1．50g（20mmol）と水酸化ナトリウム0．80g（20mmol）を水10mlに溶解する（溶液B）。上記溶液Aを撹拌し、溶液Bを徐々に加える。得られた溶液を撹拌している1000mlのアセトン中に滴下し、2．42gの白色沈殿を得た。

【0017】この化合物はFT－IR分析よりL－グリシン一銀化合物の生成を確認した。

第4実施の形態例

硝酸銀1．70g（10mmol）を水5mlに溶解する（溶液A）。L－ロイシン2．62g（20mmol）と水酸化ナトリウム0．80g（20mmol）を水10mlに溶解する（溶液B）。

【0018】上記溶液Aを撹拌し、溶液Bを徐々に加える。得られた溶液を撹拌している1000mlのアセトン中に滴下し、3．44gの白色沈殿を得た。この化合物はFT－IR分析よりL－ロイシン一銀化合物の生成を確認した。

第5実施の形態例

硝酸銀1．70g（10mmol）を水5mlに溶解する（溶液A）。

【0019】L（＋）－イソロイシン2．62g（20mmol）と水酸化ナトリウム0．80g（20mmol）を水10mlに溶解する（溶液B）。上記溶液Aを撹拌し、溶液Bを徐々に加える。得られた溶液を撹拌している1000mlのアセトン中に滴下し、3．53gの白色沈殿を得た。この化合物はFT－IR分析よりL（＋）－イソロイシン一銀化合物の生成を確認した。

【0020】第6実施の形態例

硝酸銀1．70g（10mmol）を水5mlに溶解する（溶液A）。L（－）－フェニルアラニン3．30g（20mmol）と水酸化ナトリウム0．80g（20mmol）を水10mlに溶解する（溶液B）。上記溶液Aを撹拌し、溶液Bを徐々に加える。得られた溶液を撹拌している1000mlのアセトン中に滴下し、3．96gの白色沈殿を得た。

【0021】この化合物はFT－IR分析よりL（－）－フェニルアラニン一銀化合物の生成を確認した。

第7実施の形態例

硝酸銀1．70g（10mmol）を水5mlに溶解する（溶液A）。L－バリン2．34g（20mmol）と水酸化ナトリウム0．80g（20mmol）を水10mlに溶解する（溶液B）。

【0022】上記溶液Aを撹拌し、溶液Bを徐々に加える。得られた溶液を撹拌している1000mlのアセトン中に滴下し、3．10gの白色沈殿を得た。この化合物はFT－IR分析よりL－バリン一銀化合物の生成を確認した。

第8実施の形態例

硝酸銀3．40g（10mmol）を水20mlに溶解する（溶液A）。

【0023】L－アスパラギン酸5．32g（40mmol）と水酸化ナトリウム3．20g（80mmol）を水20mlに溶解する（溶液B）。上記溶液Aを撹拌し、溶液Bを徐々に加える。得られた溶液を撹拌している1000mlのアセトン中に滴下し、8．10gの白色沈殿を得た。この化合物はFT－IR分析よりL－アスパラギン酸一銀化合物の生成を確認した。

【0024】第9実施の形態例

硝酸銀3．40g（20mmol）を水20mlに溶解する（溶液A）。L－グルタミン酸5．88g（40mmol）と水酸化ナトリウム3．20g780mmol）を水20mlに溶解する（溶液B）。上記溶液Aを撹拌し、溶液Bを徐々に加える。得られた溶液を撹拌している1000mlのアセトン中に滴下し、8．49gの白色沈殿を得た。

【0025】この化合物はFT－IR分析よりL－グルタミン酸一銀化合物の生成を確認した。

第10実施の形態例

硝酸銀1．70g（10mmol）を水5mlに溶解する（溶液A）。L－セリン2．10g（20mmol）

と水酸化ナトリウム0．80g（20mmol）を水10mlに溶解する（溶液B）。

【0026】上記溶液Aを撹拌し、溶液Bを徐々に加える。得られた溶液を撹拌している1000mlのアセトン中に滴下し、3．48gの白色沈殿を得た。この化合物はFT－IR分析よりL－セリン一銀化合物の生成を確認した。

第11実施の形態例

硝酸銀1．70g（10mmol）を水5mlに溶解する（溶液A）。

【0027】L（－）－スレオニン2．38g（20mmol）と水酸化ナトリウム0．80g（20mmol）を水10mlに溶解する（溶液B）。上記溶液Aを撹拌し、溶液Bを徐々に加える。得られた溶液を撹拌している1000mlのアセトン中に滴下し、3．71gの白色沈殿を得た。この化合物はFT－IR分析よりL（－）－スレオニン一銀化合物の生成を確認した。

【0028】第12実施の形態例

硝酸銀1．70g（10mmol）を水5mlに溶解する（溶液A）。L－チロシン3．62g（20mmol）と水酸化ナトリウム0．80g（20mmol）を水10mlに溶解する（溶液B）。上記溶液Aを撹拌し、溶液Bを徐々に加える。得られた溶液を撹拌している1000mlのアセトン中に滴下し、4．74gの白色沈殿を得た。

【0029】この化合物はFT－IR分析よりL－チロシン一銀化合物の生成を確認した。

第13実施の形態例

硝酸銀3．40g（20mmol）を水20mlに溶解する（溶液A）。L（＋）－アルギニン6．97g（40mmol）と水酸化ナトリウム1．60g（40mmol）を水20mlに溶解する（溶液B）。

【0030】上記溶液Aを撹拌し、溶液Bを徐々に加える。得られた溶液を撹拌している1000mlのアセトン中に滴下し、7．52gの黄色沈殿を得た。この化合物はFT－IR分析よりL（＋）－アルギニン一銀化合物の生成を確認した。

第14実施の形態例

硝酸銀3．40g（20mmol）を水20mlに溶解する（溶液A）。

【0031】L－アスパラギン一水和物6．01g（40mmol）と水酸化ナトリウム1．60g（40mmol）を水20mlに溶解する（溶液B）。上記溶液Aを撹拌し、溶液Bを徐々に加える。得られた溶液を撹拌している1000mlのアセトン中に滴下し、8．16gの黄色沈殿を得た。この化合物はFT－IR分析よりL－アスパラギン一銀化合物の生成を確認した。

【0032】第15実施の形態例

硝酸銀3．40g（20mmol）を水20mlに溶解する（溶液A）。L（＋）－グルタミン5．85g（40mmol）と水酸化ナトリウム1．60g（40mmol）を水20mlに溶解する（溶液B）。上記溶液Aを撹拌し、溶液Bを徐々に加える。得られた溶液を撹拌している1000mlのアセトン中に滴下し、8．02gの黄色沈殿を得た。

【0033】この化合物はFT－IR分析よりL（＋）－グルタミン一銀化合物の生成を確認した。

第16実施の形態例

硝酸銀1．70g（10mmol）を水5mlに溶解する（溶液A）。L－リジン3．65g（20mmol）と水酸化ナトリウム0．80g（20mmol）を水10mlに溶解する（溶液B）。

【0034】上記溶液Aを撹拌し、溶液Bを徐々に加える。得られた溶液を撹拌している1000mlのアセトン中に滴下し、4．40gの黄色沈殿を得た。この化合物はFT－IR分析よりL－リジン一銀化合物の生成を確認した。

第17実施の形態例

硝酸銀1．70g（10mmol）を水5mlに溶解する（溶液A）。

【0035】L－トリプトファン4．08g（20mmol）と水酸化ナトリウム0．80g（20mmol）を水10mlに溶解する（溶液B）。上記溶液Aを撹拌し、溶液Bを徐々に加える。得られた溶液を撹拌している1000mlのアセトン中に滴下し、4．21gの黄色沈殿を得た。この化合物はFT－IR分析よりL－トリプトファン一銀化合物の生成を確認した。

【0036】第18実施の形態例

硝酸銀1．70g（10mmol）を水5mlに溶解する（溶液A）。L（－）－プロリン2．30g（20mmol）を水10mlに溶解する（溶液B）。上記溶液Aを撹拌し、溶液Bを徐々に加える。得られた溶液を撹拌している1000mlのアセトン中に滴下し、3．20gの白色沈殿を得た。

【0037】この化合物はFT－IR分析よりL（－）－プロリン一銀化合物の生成を確認した。以上によって得られた銀化合物の抗菌性をつぎの方法により確認した。

細菌：ソイビーン・カゼイン・ダイジェスト（SCD）液体培地5mlに接種し、35℃、24時間前培養し、前培養した菌液の100倍希釈液0．1mlを2mlの検体を含むSCD培地に接種した。35℃、72時間振とう培養したのち増殖の有無を確認した。

【0038】酵母：グルコース・ペプトン（GP）液体培地5mlに接種し、35℃、24時間前培養し、前培養した菌液の100倍希釈液0．1mlを2mlの検体を含むGP培地に接種した。35℃、72時間振とう培養したのち増殖の有無を確認した。

かび：グルコース・ペプトン（GP）寒天培地に接種し、24℃、1週間前培養し、前培養した胞子懸濁液

0．1ｍｌを2ｍｌの検体を含むＧＰ寒天培地に接種した。24℃、168時間振とう培養したのち増殖の有無を確認した。

【0039】抗菌活性測定は以下に示す菌種について行った。

真菌

1．Candida albicans（カンジダアルビカンス）

2．Aureobasidium pullulans（オーレオバシディアムプルランス）

3．Aspergillus niger（アスペルギラスニガー）

4．Phoma glomerata（フォーマグロメラータ）

5．Alternaria dianthicola（アルテルナリアディアンティコーラ）

6．Trichoderma（トリコデルマ）

7．Penicillium citrinum（ペニシリウムシトリナム）

8．Chaetomium globosum（シェトミウムグロボサム）

9．Cladosporium sphaerospermum（クラドスポリウムスヒィロスペルマム）

10．Fusarium moniliforme（フザリウムモニリフォルメ）

細菌

11．Escherichia coli（エスケリフィアコリ）

12．Staphylococcus aureus（スタフィロコッカスオーレウス）

13．Pseudomonas aeruginosa（スードモナスアルギノーザ）

その結果を表1に示す。

【0040】

【表1】

菌類＼形態例	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
3	○	×	×	×	×	×	×	○	×	○	○	○	○	○	○	○	○	×
4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
5	○	○	○	○	○	○	○	×	×	×	×	×	○	○	○	○	○	×
6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
7	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
8	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
9	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
10	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
11	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
12	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
13	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

【0041】

【発明の効果】以上詳細に説明した本発明によると、アミノ酸と銀イオンとを結合してなる化合物として抗菌抗かび剤を構成したことにより、この化合物を無機および有機の固体担体や液体担体に担持させることができ、しかもそれら担体に悪い影響を与えることがないという効果を有する。

【0042】さらに、抗菌抗かび効果や耐候性，耐熱性、耐水性、強度にすぐれ、人体に対して安全性を有すると共に耐久性、残効性、経済性にすぐれるという効果を有する。また、抗生物質耐性菌に対しても効果を有する。

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(54) ANTIBACTERIAL-FUNGAL AGENT AND ANTIBACTERIAL-FUNGAL MATERIAL

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain the subject agent having a wide range of antibacterial-fungal activity and high safety e.g. in terms of cutaneous irritation by including a compound formed by binding an amino acid to silver ion as an active ingredient.

SOLUTION: This agent includes a compound, as an active ingredient, formed by binding (A) an amino acid (histidine, alanine, glycine, leucine, phenylalanine, glutamic acid, aspartic acid or the like or a derivative thereof or the like) to (B) silver ion. The compound is obtained by reacting the component (A) with the component (B) in a solution and precipitating a solid by treating the resultant solution with an organic solvent, such as IPA or acetone. It is preferable that about 0.5-2 mol(s) of the component A is added to 1 mol of the component B to conduct the reaction. The compound can be used as an antibacterial antifungal agent as it is and furthermore, can be used as an antibacterial-fungal material or an antibacterial-fungal composition by being carried by various carriers (solid carriers, liquid carriers, mixtures thereof or the like).

LEGAL STATUS

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[Date of final disposal for application]

[Patent number]

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CLAIMS

[Claim(s)]
[Claim 1] The antibacterial antifungal agent characterized by making into an active principle the compound which comes to join amino acid and complex ion together.
[Claim 2] The anti-[antibacterial] mold ingredient characterized by making a solid support support the compound which comes to join amino acid and complex ion together.
[Claim 3] The anti-[antibacterial] mold ingredient characterized by making liquid support support the compound which comes to join amino acid and complex ion together.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the anti-[antibacterial] mold ingredient using an antibacterial antifungal agent and it with high safeties, such as skin irritation, while having extensive anti-[antibacterial] mold activity.
[0002]
[Description of the Prior Art] In recent years, development and use of the functional material which gave the new function which applied the drugs which have anti-[antibacterial] mold activity to various life related materials are performed briskly. These functional materials give a new function by adding the drugs which have anti-[antibacterial] mold activity for the material concerned.
[0003] In case application of the antibacterial antifungal agent to these functional material fields is aimed at, while it is required that it should have an antimicrobial spectrum and safety extensive about the drugs concerned, to excel in that drugs do not have bad effect on the quality of a material, endurance, residual effectiveness, and economical efficiency etc. is demanded. Then, as drugs currently used for the old antibacterial antifungal agent, a benzimidazole system, a nitril system, an iso thiazoline system, a halo allyl compound sulfone system, an iodine propargyl system, a benzothiazole system, a phenol system, an organic tin system, a pyridine system, a diphenyl ether system, and a chlorhexidine system are raised.
[0004]
[Problem(s) to be Solved by the Invention] Such an antibacterial antifungal agent has many which do not show anti-[antibacterial] mold effectiveness sufficient with one kind of just drugs. Moreover, even if the anti-[antibacterial] mold activity which the drugs itself show is excellent, after a problem's arising in respect of compatibility with a material and applying to a material, surely sufficient anti-[antibacterial] mold effectiveness is not necessarily shown.
[0005] Furthermore, when seen about the safety of these antibacterial antifungal agents, there was much what shows Acute Oral Toxicity, skin irritation, membrane stimulative, etc., like what has strong anti-[antibacterial] mold activity, these operations were strong and there was a problem in applying such an antibacterial antifungal agent to a living environment generally.
[0006]
[Means for Solving the Problem] This invention is the antibacterial antifungal agent which combined amino acid and complex ion, and is the anti-[antibacterial] mold ingredient which made a solid support and liquid support support this compound further. The ligand of amino acid configurates this compound to silver, and the complex is formed, or amino acid and silver are considered to form the salt.
[0007] The above-mentioned compound makes amino acid and complex ion react in a solution, and the generated solution is manufactured by settling a solid-state with organic solvents, such as IPA and an acetone. A reaction is performed by adding about 0.5-2 mols of amino acid, and making it react to one mol of complex ion. The amino acid used is these derivatives, such as a histidine, an alanine, a glycine, a leucine, an isoleucine, a phenylalanine, a valine, an aspartic acid, glutamic acid, a serine, threonine, a thyrosin, an arginine, an asparagine, a glutamine, a lysine, a tryptophan, and a proline, etc.
[0008] The complex ion used can be used without limitation of the amino acid and the silver compound in which a reaction is possible to be used. Specifically, they are a silver nitrate, silver nitrite, perchloric acid silver, silver acetate, HOU ****-ized silver, etc. Furthermore, if complex ion and above-mentioned/, or the above-mentioned amino acid is dissolved as a solvent used for generation of a compound, it can be used without

limitation of a well-known solvent. there are ketones, such as ether, such as hydrocarbons, such as alcohols, such as a water solution of hydroxylation alkali metal, such as water, a sodium hydroxide, a lithium hydroxide, a potassium hydroxide, or cesium hydroxide, a methanol, ethanol, or IPA, benzene, toluene, a xylene, a hexane, or a cyclohexane, and diethylether, and an acetone, and, specifically, independent or the thing which is being mixed and to use cuts this.

[0009] Thus, the compound obtained has the outstanding antibacterial antifungal action, it can be used for it as an antibacterial antifungal agent as it is, and further various support can be made to be able to support it, and it can be used as an anti-[antibacterial] mold ingredient, an anti-[antibacterial] mold constituent, etc. Then, as support which carries out in this way and is used, both a solid support liquid support and such mixture can be used.

[0010] As a solid support, an inorganic solid support and an organic solid support are raised, and they are a silica, hydroxyapatite, a zeolite, titanium oxide, etc. as this inorganic solid support. In the constituent containing these inorganic solid supports and this invention compounds, it is desirable that this invention compound is fixed by this solid support. The anti-[antibacterial] mold ingredient containing such an inorganic solid support and this invention compound does not have discoloration by the fall of the antimicrobial activity by the substitution reaction of the silver under existence of the salt which is the fault of the existing silver content antimicrobial agent represented by for example, zeolite silver, and the light of complex ion etc.

[0011] Next as an organic solid support, resin, such as various waxes, such as a wax, a varnish, lacquer, and synthetic coating material, polyethylene, a polyvinyl chloride, polystyrene, polyethylene terephthalate, acrylic resin, an epoxy resin, phenol resin, melamine resin, and a urea-resin, etc. is raised. As liquid support, organic solvents, such as water, alcohols, hydrocarbons, ether, and ketones, are raised.

[0012] Although especially the loadings of this invention compound in the antibacterial antifungal agent or ingredient of this invention are not limited, 0.01 - 90 % of the weight is desirable.

[0013]

[Embodiment of the Invention] The gestalt of operation of this invention is explained below.

3.40g (20mmol) of example silver nitrates of a gestalt of the 1st operation is dissolved in 50ml of water (solution A). L-histidine 3.20g (21mmol) and 0.90g (22mmol) of sodium hydroxides are dissolved in 20ml of water (solution B).

[0014] The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 5.80g white precipitate was obtained. This compound checked generation of L-histidine silver compound from Fourier transform infrared spectrophotometry.

1.70g (10mmol) of example silver nitrates of a gestalt of the 2nd operation is dissolved in 5ml of water (solution (solution A).

[0015] L-alanine 1.78g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 2.50g white precipitate was obtained. This compound checked generation of L-alanine silver compound from Fourier transform infrared spectrophotometry.

[0016] 1.70g (10mmol) of example silver nitrates of a gestalt of the 3rd operation is dissolved in 5ml of water (solution A). L-glycine 1.50g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 2.42g white precipitate was obtained.

[0017] This compound checked generation of L-glycine silver compound from Fourier transform infrared spectrophotometry.

1.70g (10mmol) of example silver nitrates of a gestalt of the 4th operation is dissolved in 5ml of water (solution A). 2.62g (20mmol) of L-leucines and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B).

[0018] The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.44g white precipitate was obtained. This compound checked generation of an L-leucine silver compound from Fourier transform infrared spectrophotometry.

1.70g (10mmol) of example silver nitrates of a gestalt of the 5th operation is dissolved in 5ml of water (solution

A).
[0019] L(+)-isoleucine 2.62g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.53g white precipitate was obtained. This compound checked generation of an L(+)-isoleucine silver compound from Fourier transform infrared spectrophotometry.
[0020] 1.70g (10mmol) of example silver nitrates of a gestalt of the 6th operation is dissolved in 5ml of water (solution A). L(-)-phenylalanine 3.30g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.96g white precipitate was obtained.
[0021] This compound checked generation of an L(-)-phenylalanine silver compound from Fourier transform infrared spectrophotometry.
1.70g (10mmol) of example silver nitrates of a gestalt of the 7th operation is dissolved in 5ml of water (solution A). 2.34g (20mmol) of L-valine and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B).
[0022] The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.10g white precipitate was obtained. This compound checked generation of an L-valine silver compound from Fourier transform infrared spectrophotometry.
3.40g (10mmol) of example silver nitrates of a gestalt of the 8th operation is dissolved in 20ml of water (solution A).
[0023] 5.32g (40mmol) of L-asparatic acid and 3.20g (80mmol) of sodium hydroxides are dissolved in 20ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 8.10g white precipitate was obtained. This compound checked generation of a L-asparatic acid-silver compound from Fourier transform infrared spectrophotometry.
[0024] 3.40g (20mmol) of example silver nitrates of a gestalt of the 9th operation is dissolved in 20ml of water (solution A). 5.88g (40mmol) of L-glutamic acid and 3.20g780mmol of sodium hydroxides are dissolved in 20ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 8.49g white precipitate was obtained.
[0025] This compound checked generation of a L-glutamic acid-silver compound from Fourier transform infrared spectrophotometry.
1.70g (10mmol) of example silver nitrates of a gestalt of the 10th operation is dissolved in 5ml of water (solution A). L-serine 2.10g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B).
[0026] The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.48g white precipitate was obtained. This compound checked generation of L-SERIN silver compound from Fourier transform infrared spectrophotometry.
1.70g (10mmol) of example silver nitrates of a gestalt of the 11th operation is dissolved in 5ml of water (solution A).
[0027] L(-)-threonine 2.38g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.71g white precipitate was obtained. This compound checked generation of an L(-)-threonine silver compound from Fourier transform infrared spectrophotometry.
[0028] 1.70g (10mmol) of example silver nitrates of a gestalt of the 12th operation is dissolved in 5ml of water (solution A). L-thyrosin 3.62g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 4.74g white precipitate was obtained.
[0029] This compound checked generation of L-thyrosin silver compound from Fourier transform infrared

spectrophotometry.
3.40g (20mmol) of example silver nitrates of a gestalt of the 13th operation is dissolved in 20ml of water (solution A). L(+)-arginine 6.97g (40mmol) and 1.60g (40mmol) of sodium hydroxides are dissolved in 20ml of water (solution B).
[0030] The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 7.52g yellow precipitate was obtained. This compound checked generation of an L(+)-arginine silver compound from Fourier transform infrared spectrophotometry.
3.40g (20mmol) of example silver nitrates of a gestalt of the 14th operation is dissolved in 20ml of water (solution A).
[0031] 6.01g (40mmol) of L-asparagine-hydrates and 1.60g (40mmol) of sodium hydroxides are dissolved in 20ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 8.16g yellow precipitate was obtained. This compound checked generation of L-asparagine silver compound from Fourier transform infrared spectrophotometry.
[0032] 3.40g (20mmol) of example silver nitrates of a gestalt of the 15th operation is dissolved in 20ml of water (solution A). L(+)-glutamine 5.85g (40mmol) and 1.60g (40mmol) of sodium hydroxides are dissolved in 20ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 8.02g yellow precipitate was obtained.
[0033] This compound checked generation of an L(+)-glutamine silver compound from Fourier transform infrared spectrophotometry.
1.70g (10mmol) of example silver nitrates of a gestalt of the 16th operation is dissolved in 5ml of water (solution A). L-lysine 3.65g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B).
[0034] The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 4.40g yellow precipitate was obtained. This compound checked generation of L-RIJIN silver compound from Fourier transform infrared spectrophotometry.

1.70g (10mmol) of example silver nitrates of a gestalt of the 17th operation is dissolved in 5ml of water (solution A).
[0035] 4.08g (20mmol) of L-tryptophans and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 4.21g yellow precipitate was obtained. This compound checked generation of an L-tryptophan silver compound from Fourier transform infrared spectrophotometry.
[0036] 1.70g (10mmol) of example silver nitrates of a gestalt of the 18th operation is dissolved in 5ml of water (solution A). L(-)-proline 2.30g (20mmol) is dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.20g white precipitate was obtained.
[0037] This compound checked generation of an L(-)-proline silver compound from Fourier transform infrared spectrophotometry. It checked antibacterial [of the silver compound obtained by the above] by the following approach.
Bacteria: 5ml of soy bean casein digest (SCD) liquid media was inoculated, and the SCD culture medium which carries out preculture for 24 hours and contains 35 degrees C of 2ml specimens for 0.1ml of 100 time diluents of the fungus liquid which carried out preculture was inoculated. 35 degrees C of existence of growth were checked after carrying out shaking culture for 72 hours.
[0038] Yeast: 5ml of glucose peptone (GP) liquid media was inoculated, and GP culture medium which carries out preculture for 24 hours and contains 35 degrees C of 2ml specimens for 0.1ml of 100 time diluents of the fungus liquid which carried out preculture was inoculated. 35 degrees C of existence of growth were checked after carrying out shaking culture for 72 hours.
Mold: The glucose peptone (GP) agar medium was inoculated, preculture was carried out for one week and 0.1ml of 24 degrees C of spore suspension which carried out preculture was inoculated into GP agar medium

containing a 2ml specimen. 24 degrees C of existence of growth were checked after carrying out shaking culture for 168 hours.

[0039] Antimicrobial activity measurement followed the strain shown below.

Fungus 1.Candida albicans (Candida albicans)

2. Aureobasidium Pullulans (Aureobasidium Pullulans)

3. Aspergillus Niger (Aspergillus Niger)

4. Phoma Glomerata (Phoma Glomerata)

5. Alternaria Dianthicola (Alternaria Dianthicola)

6. Trichoderma (Trichoderma)

7. Penicillium Citrinum (Penicillium Citrinum)

8. Chaetomium Globosum (Chaetomium Globosum)

9. Cladosporium Sphaerospermum (Cladosporium Sphaerospermum)

10. Fusarium Moniliforme (Fusarium Moniliforme)

Bacteria 11.Escherichia coli (Escherichia coli)

12. Staphylococcus Aureus (Staphylococcus Aureus)

13. Pseudomonas Aeruginosa (Pseudomonas Aeruginosa)

The result is shown in Table 1.

[0040]

[Table 1]

形態例 / 菌類	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
3	○	×	×	×	×	×	×	○	×	○	○	○	○	○	○	○	○	×
4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
5	○	○	○	○	○	○	○	×	×	×	×	×	○	○	○	○	○	×
6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
7	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
8	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
9	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
10	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
11	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
12	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
13	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

[0041]

[Effect of the Invention] According to this invention explained to the detail above, by having constituted the antibacterial antifungal agent as a compound which comes to join amino acid and complex ion together, inorganic and organic a solid support and liquid support can be made to support this compound, and it has the effectiveness of moreover not having bad effect on these support.

[0042] Furthermore, it excels in the anti-[antibacterial] mold effectiveness, weatherability, thermal resistance, a water resisting property, and reinforcement, and while having safety to the body, it has the effectiveness of excelling in endurance, residual effectiveness, and economical efficiency. Moreover, it has effectiveness also to antibiotic resistant bacteria.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the anti-[antibacterial] mold ingredient using an antibacterial antifungal agent and it with high safeties, such as skin irritation, while having extensive anti-[antibacterial] mold activity.

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PRIOR ART

[Description of the Prior Art] In recent years, development and use of the functional material which gave the new function which applied the drugs which have anti-[antibacterial] mold activity to various life related materials are performed briskly. These functional materials give a new function by adding the drugs which have anti-[antibacterial] mold activity for the material concerned.
[0003] In case application of the antibacterial antifungal agent to these functional material fields is aimed at, while it is required that it should have an antimicrobial spectrum and safety extensive about the drugs concerned, to excel in that drugs do not have bad effect on the quality of a material, endurance, residual effectiveness, and economical efficiency etc. is demanded. Then, as drugs currently used for the old antibacterial antifungal agent, a benzimidazole system, a nitril system, an iso thiazoline system, a halo allyl compound sulfone system, an iodine propargyl system, a benzothiazole system, a phenol system, an organic tin system, a pyridine system, a diphenyl ether system, and a chlorhexidine system are raised.

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EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention explained to the detail above, by having constituted the antibacterial antifungal agent as a compound which comes to join amino acid and complex ion together, inorganic and organic a solid support and liquid support can be made to support this compound, and it has the effectiveness of moreover not having bad effect on these support.
[0042] Furthermore, it excels in the anti-[antibacterial] mold effectiveness, weatherability, thermal resistance, a water resisting property, and reinforcement, and while having safety to the body, it has the effectiveness of excelling in endurance, residual effectiveness, and economical efficiency. Moreover, it has effectiveness also to antibiotic resistant bacteria.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Such an antibacterial antifungal agent has many which do not show anti-[antibacterial] mold effectiveness sufficient with one kind of just drugs. Moreover, even if the anti-[antibacterial] mold activity which the drugs itself show is excellent, after a problem's arising in respect of compatibility with a material and applying to a material, surely sufficient anti-[antibacterial] mold effectiveness is not necessarily shown.
[0005] Furthermore, when seen about the safety of these antibacterial antifungal agents, there was much what shows Acute Oral Toxicity, skin irritation, membrane stimulative, etc., like what has strong anti-[antibacterial] mold activity, these operations were strong and there was a problem in applying such an antibacterial antifungal agent to a living environment generally.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] This invention is the antibacterial antifungal agent which combined amino acid and complex ion, and is the anti-[antibacterial] mold ingredient which made a solid support and liquid support support this compound further. The ligand of amino acid configurates this compound to silver, and the complex is formed, or amino acid and silver are considered to form the salt.
[0007] The above-mentioned compound makes amino acid and complex ion react in a solution, and the generated solution is manufactured by settling a solid-state with organic solvents, such as IPA and an acetone. A reaction is performed by adding about 0.5-2 mols of amino acid, and making it react to one mol of complex ion. The amino acid used is these derivatives, such as a histidine, an alanine, a glycine, a leucine, an isoleucine, a phenylalanine, a valine, an aspartic acid, glutamic acid, a serine, threonine, a thyrosin, an arginine, an asparagine, a glutamine, a lysine, a tryptophan, and a proline, etc.
[0008] The complex ion used can be used without limitation of the amino acid and the silver compound in which a reaction is possible to be used. Specifically, they are a silver nitrate, silver nitrite, perchloric acid silver, silver acetate, HOU ****-ized silver, etc. Furthermore, if complex ion and above-mentioned/, or the above-mentioned amino acid is dissolved as a solvent used for generation of a compound, it can be used without limitation of a well-known solvent. there are ketones, such as ether, such as hydrocarbons, such as alcohols, such as a water solution of hydroxylation alkali metal, such as water, a sodium hydroxide, a lithium hydroxide, a potassium hydroxide, or cesium hydroxide, a methanol, ethanol, or IPA, benzene, toluene, a xylene, a hexane, or a cyclohexane, and diethylether, and an acetone, and, specifically, independent or the thing which is being mixed and to use cuts this.
[0009] Thus, the compound obtained has the outstanding antibacterial antifungal action, it can be used for it as an antibacterial antifungal agent as it is, and further various support can be made to be able to support it, and it can be used as an anti-[antibacterial] mold ingredient, an anti-[antibacterial] mold constituent, etc. Then, as support which carries out in this way and is used, both a solid support liquid support and such mixture can be used.
[0010] As a solid support, an inorganic solid support and an organic solid support are raised, and they are a silica, hydroxyapatite, a zeolite, titanium oxide, etc. as this inorganic solid support. In the constituent containing these inorganic solid supports and this invention compounds, it is desirable that this invention compound is fixed by this solid support. The anti-[antibacterial] mold ingredient containing such an inorganic solid support and this invention compound does not have discoloration by the fall of the antimicrobial activity by the substitution reaction of the silver under existence of the salt which is the fault of the existing silver content antimicrobial agent represented by for example, zeolite silver, and the light of complex ion etc.
[0011] Next as an organic solid support, resin, such as various waxes, such as a wax, a varnish, lacquer, and synthetic coating material, polyethylene, a polyvinyl chloride, polystyrene, polyethylene terephthalate, acrylic resin, an epoxy resin, phenol resin, melamine resin, and a urea-resin, etc. is raised. As liquid support, organic solvents, such as water, alcohols, hydrocarbons, ether, and ketones, are raised.
[0012] Although especially the loadings of this invention compound in the antibacterial antifungal agent or ingredient of this invention are not limited, 0.01 - 90 % of the weight is desirable.
[0013]
[Embodiment of the Invention] The gestalt of operation of this invention is explained below.
3.40g (20mmol) of example silver nitrates of a gestalt of the 1st operation is dissolved in 50ml of water (solution A). L-histidine 3.20g (21mmol) and 0.90g (22mmol) of sodium hydroxides are dissolved in 20ml of water (solution B).

[0014] The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 5.80g white precipitate was obtained. This compound checked generation of L-histidine silver compound from Fourier transform infrared spectrophotometry.
1.70g (10mmol) of example silver nitrates of a gestalt of the 2nd operation is dissolved in 5ml of water (solution A).
[0015] L-alanine 1.78g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 2.50g white precipitate was obtained. This compound checked generation of L-alanine silver compound from Fourier transform infrared spectrophotometry.
[0016] 1.70g (10mmol) of example silver nitrates of a gestalt of the 3rd operation is dissolved in 5ml of water (solution A). L-glycine 1.50g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 2.42g white precipitate was obtained.
[0017] This compound checked generation of L-glycine silver compound from Fourier transform infrared spectrophotometry.
1.70g (10mmol) of example silver nitrates of a gestalt of the 4th operation is dissolved in 5ml of water (solution A). 2.62g (20mmol) of L-leucines and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B).
[0018] The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.44g white precipitate was obtained. This compound checked generation of an L-leucine silver compound from Fourier transform infrared spectrophotometry.
1.70g (10mmol) of example silver nitrates of a gestalt of the 5th operation is dissolved in 5ml of water (solution A).
[0019] L(+)-isoleucine 2.62g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.53g white precipitate was obtained. This compound checked generation of an L(+)-isoleucine silver compound from Fourier transform infrared spectrophotometry.
[0020] 1.70g (10mmol) of example silver nitrates of a gestalt of the 6th operation is dissolved in 5ml of water (solution A). L(-)-phenylalanine 3.30g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.96g white precipitate was obtained.
[0021] This compound checked generation of an L(-)-phenylalanine silver compound from Fourier transform infrared spectrophotometry.
1.70g (10mmol) of example silver nitrates of a gestalt of the 7th operation is dissolved in 5ml of water (solution A). 2.34g (20mmol) of L-valine and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B).
[0022] The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.10g white precipitate was obtained. This compound checked generation of an L-valine silver compound from Fourier transform infrared spectrophotometry.
3.40g (10mmol) of example silver nitrates of a gestalt of the 8th operation is dissolved in 20ml of water (solution A).
[0023] 5.32g (40mmol) of L-asparatic acid and 3.20g (80mmol) of sodium hydroxides are dissolved in 20ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 8.10g white precipitate was obtained. This compound checked generation of a L-asparatic acid-silver compound from Fourier transform infrared spectrophotometry.
[0024] 3.40g (20mmol) of example silver nitrates of a gestalt of the 9th operation is dissolved in 20ml of water

(solution A). 5.88g (40mmol) of L-glutamic acid and 3.20g780mmol of sodium hydroxides are dissolved in 20ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 8.49g white precipitate was obtained.

[0025] This compound checked generation of a L-glutamic acid-silver compound from Fourier transform infrared spectrophotometry.

1.70g (10mmol) of example silver nitrates of a gestalt of the 10th operation is dissolved in 5ml of water (solution A). L-serine 2.10g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B).

[0026] The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.48g white precipitate was obtained. This compound checked generation of L-SERIN silver compound from Fourier transform infrared spectrophotometry.

1.70g (10mmol) of example silver nitrates of a gestalt of the 11th operation is dissolved in 5ml of water (solution A).

[0027] L(-)-threonine 2.38g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.71g white precipitate was obtained. This compound checked generation of an L(-)-threonine silver compound from Fourier transform infrared spectrophotometry.

[0028] 1.70g (10mmol) of example silver nitrates of a gestalt of the 12th operation is dissolved in 5ml of water (solution A). L-thyrosin 3.62g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 4.74g white precipitate was obtained.

[0029] This compound checked generation of L-thyrosin silver compound from Fourier transform infrared spectrophotometry.

3.40g (20mmol) of example silver nitrates of a gestalt of the 13th operation is dissolved in 20ml of water (solution A). L(+)-arginine 6.97g (40mmol) and 1.60g (40mmol) of sodium hydroxides are dissolved in 20ml of water (solution B).

[0030] The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 7.52g yellow precipitate was obtained. This compound checked generation of an L(+)-arginine silver compound from Fourier transform infrared spectrophotometry.

3.40g (20mmol) of example silver nitrates of a gestalt of the 14th operation is dissolved in 20ml of water (solution A).

[0031] 6.01g (40mmol) of L-asparagine-hydrates and 1.60g (40mmol) of sodium hydroxides are dissolved in 20ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 8.16g yellow precipitate was obtained. This compound checked generation of L-asparagine silver compound from Fourier transform infrared spectrophotometry.

[0032] 3.40g (20mmol) of example silver nitrates of a gestalt of the 15th operation is dissolved in 20ml of water (solution A). L(+)-glutamine 5.85g (40mmol) and 1.60g (40mmol) of sodium hydroxides are dissolved in 20ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 8.02g yellow precipitate was obtained.

[0033] This compound checked generation of an L(+)-glutamine silver compound from Fourier transform infrared spectrophotometry.

1.70g (10mmol) of example silver nitrates of a gestalt of the 16th operation is dissolved in 5ml of water (solution A). L-lysine 3.65g (20mmol) and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B).

[0034] The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 4.40g yellow precipitate was obtained. This compound checked generation of L-RIJIN silver compound from Fourier transform infrared spectrophotometry.

1.70g (10mmol) of example silver nitrates of a gestalt of the 17th operation is dissolved in 5ml of water (solution A).
[0035] 4.08g (20mmol) of L-tryptophans and 0.80g (20mmol) of sodium hydroxides are dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 4.21g yellow precipitate was obtained. This compound checked generation of an L-tryptophan silver compound from Fourier transform infrared spectrophotometry.
[0036] 1.70g (10mmol) of example silver nitrates of a gestalt of the 18th operation is dissolved in 5ml of water (solution A). L(-)-proline 2.30g (20mmol) is dissolved in 10ml of water (solution B). The above-mentioned solution A is stirred and Solution B is added gradually. It was dropped into the 1000ml acetone which has stirred the obtained solution, and 3.20g white precipitate was obtained.
[0037] This compound checked generation of an L(-)-proline silver compound from Fourier transform infrared spectrophotometry. It checked antibacterial [of the silver compound obtained by the above] by the following approach.
Bacteria: 5ml of soy bean casein digest (SCD) liquid media was inoculated, and the SCD culture medium which carries out preculture for 24 hours and contains 35 degrees C of 2ml specimens for 0.1ml of 100 time diluents of the fungus liquid which carried out preculture was inoculated. 35 degrees C of existence of growth were checked after carrying out shaking culture for 72 hours.
[0038] Yeast: 5ml of glucose peptone (GP) liquid media was inoculated, and GP culture medium which carries out preculture for 24 hours and contains 35 degrees C of 2ml specimens for 0.1ml of 100 time diluents of the fungus liquid which carried out preculture was inoculated. 35 degrees C of existence of growth were checked after carrying out shaking culture for 72 hours.
Mold: The glucose peptone (GP) agar medium was inoculated, preculture was carried out for one week and 0.1ml of 24 degrees C of spore suspension which carried out preculture was inoculated into GP agar medium containing a 2ml specimen. 24 degrees C of existence of growth were checked after carrying out shaking culture for 168 hours.
[0039] Antimicrobial activity measurement followed the strain shown below.
Fungus 1.Candida albicans (Candida albicans)
2. Aureobasidium Pullulans (Aureobasidium Pullulans)
3. Aspergillus Niger (Aspergillus Niger)
4. Phoma Glomerata (Phoma Glomerata)
5. Alternaria Dianthicola (Alternaria Dianthicola)
6. Trichoderma (Trichoderma)
7. Penicillium Citrinum (Penicillium Citrinum)
8. Chaetomium Globosum (Chaetomium Globosum)
9. Cladosporium Sphaerospermum (Cladosporium Sphaerospermum)
10. Fusarium Moniliforme (Fusarium Moniliforme)
Bacteria 11.Escherichia coli (Escherichia coli)
12. Staphylococcus Aureus (Staphylococcus Aureus)
13. Pseudomonas Aeruginosa (Pseudomonas Aeruginosa)
The result is shown in Table 1.
[0040]
[Table 1]

形態例 / 菌類	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
3	○	×	×	×	×	×	×	○	×	○	○	○	○	○	○	○	○	×
4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
5	○	○	○	○	○	○	○	×	×	×	×	×	○	○	○	○	○	×
6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
7	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
8	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
9	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
10	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
11	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
12	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
13	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

[Translation done.]